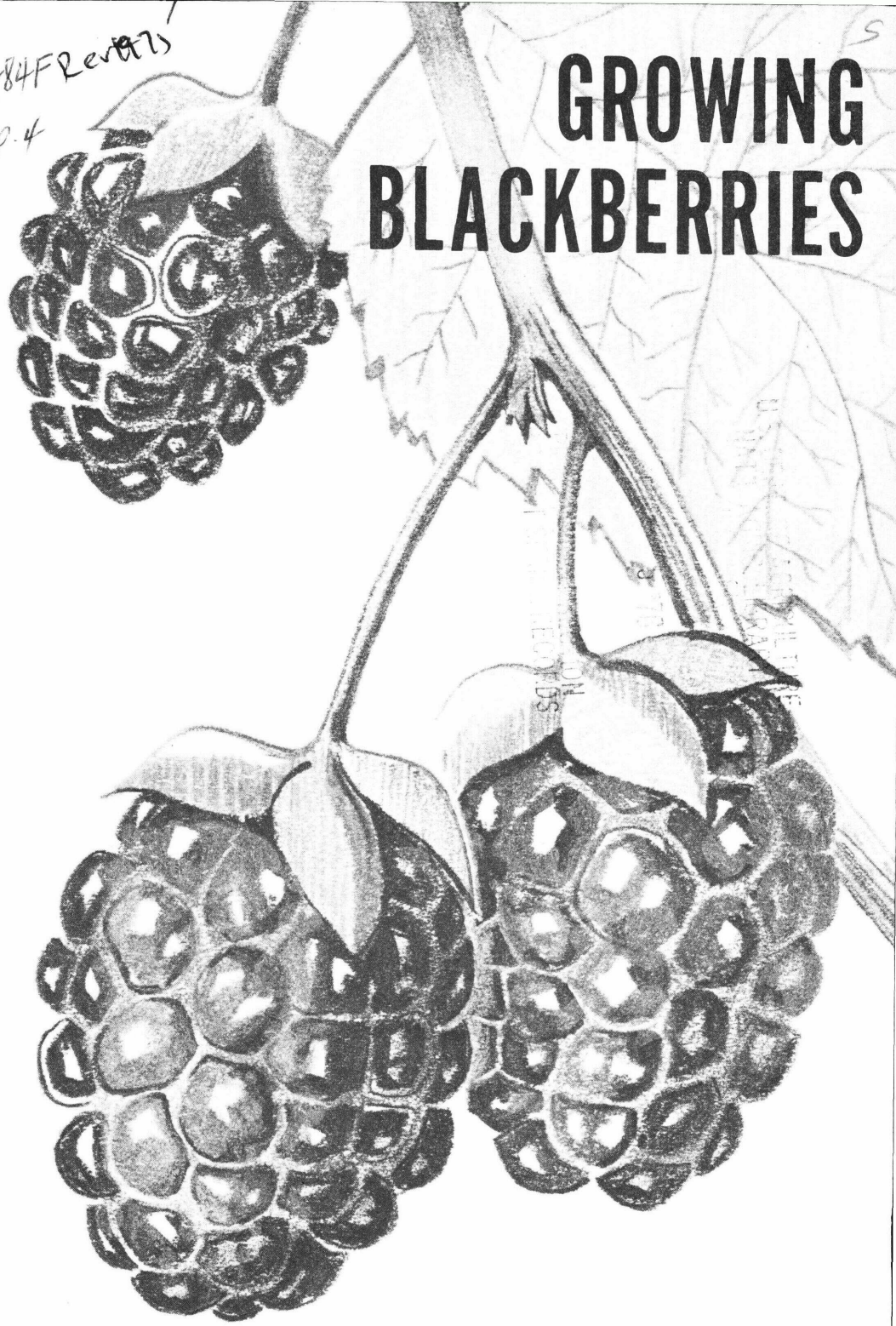


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GROWING BLACKBERRIES



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GROWING BLACKBERRIES

Prepared by Northeastern Region, *Agricultural Research Service*

Blackberries grow best in temperate climates. They are not well adapted to areas in the Plains States or Mountain States where summers are hot and dry and winters are severe.

If properly managed, a blackberry plantation should yield at least 6,000 pounds of berries per acre. To get the greatest yield and longest productive life from the plantation—

- Choose types and varieties that are adapted to your area.
- Prepare the soil thoroughly.
- Plant only highest quality stock.
- Cultivate frequently.
- Apply fertilizer every year.
- Thin out all weak canes and suckers.
- Protect plants from insects, diseases, and winter injury.

TYPES OF BLACKBERRIES

The two types of blackberries—erect and trailing—differ primarily in the character of their canes. Erect blackberries have arched self-supporting canes. Trailing blackberries, also called dewberries, ground blackberries, or running blackberries, have canes that are not self-supporting; the canes must be tied to poles or trellises in cultivation.

The two types also differ in fruit characteristics. Fruit clusters of the trailing blackberry are more open than those of the erect blackberry. Trailing blackberries generally ripen earlier and are often larger and sweeter than the erect type.

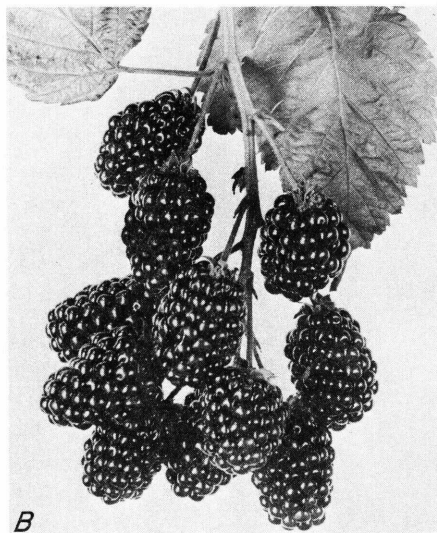
Some varieties have canes that trail the first year after planting. Canes developed in subsequent years are more erect. These are called semitrailing blackberries, but they are essentially erect varieties.

PLANTING SITES

Availability of soil moisture is the most important factor to consider in choosing a planting site for blackberries. While the fruit is growing and ripening, blackberries need a large supply of moisture. During the winter, however, the plants are harmed by water standing around their roots.

Almost any soil type, except very sandy soils, is suitable for blackberries as long as the drainage is good.

In areas where winters are severe, the slope of the planting site is important. Blackberries planted on hillsides are in less danger of winter injury and damage from late spring frosts than those planted in valleys.



BN-10850-X

Typical fruit clusters of blackberries: *A*, trailing varieties *B*, erect varieties.

In areas where drying winds occur frequently, the plantation should be sheltered by surrounding hills, trees, or shrubs.

PLANTING

Plant blackberries as soon as you can prepare the soil—in early spring in the North, in late winter or early spring in the South.

Preparing the Soil

Prepare the soil for blackberries as thoroughly as you would for a garden. For best results, plow to a depth of 9 inches as soon as the soil is in workable condition. Disk and harrow the soil just before setting the plants.

Before establishing a new plantation, it is a good idea to seed and plow under one or two green-manure crops of cowpeas or of rye and vetch. This thorough working gets the soil in good condition for planting, and the added

organic matter and nitrogen help the plantation to produce an early fruit crop.

Spacing the Plants

Plant erect varieties of blackberries 5 feet apart in rows that are 8 feet apart. Space vigorous varieties of trailing or semitrailing blackberries, such as Thornless Evergreen, 8 to 12 feet apart in rows 10 feet apart. Space other trailing varieties 4 to 6 feet apart in rows 8 feet apart. (For description of varieties, see pp. 14 to 18.)

In the Central States, set erect varieties 2 feet apart in rows 9 to 10 feet apart. Let the plants grow into hedgerows.

Setting the Plants

Do not let planting stock dry out. If you cannot plant the stock as soon as you receive it, protect the roots from drying by heeling in the plants.

To heel in, dig a trench deep enough to contain the roots. Spread the plants along the trench, roots down, and cover the roots with moist soil.

If the plants are dry when you receive them, soak the roots in water for several hours before you plant them or heel them in.

When you are ready to set the plants in the field, dip the roots in a thin mud made with clay and water or keep the plants in polyethylene bags. This coating helps to protect the roots from rapid drying while the plants are being set.

Before setting the plants, cut the tops back so they are about 6 inches long. The 6-inch top is useful as a handle when setting the plants and will serve to show the location of the plants.

To make a planting hole, cut a slit in the soil with the blade of a mattock or shovel. Press the handle of the tool forward to open the slit.

Put the root of the blackberry plant in the hole. Set it so it is about the same depth as it was in the nursery.

Withdraw the blade of the mattock

or shovel and pack the soil firmly around the root with your heel.

INTERCROPPING

During the first summer after the blackberry plants are set, vegetables can be grown between the rows. Intercropping is not used in the Northwest and is used much less elsewhere now than formerly.

Good crops for intercropping are cabbage, cauliflower, beans, peas, and summer squash. Do not grow grain crops; they are not cultivated and they take too much of the moisture and nutrients needed by the blackberry plants.

Do not grow intercrops after the first year; blackberry plants of bearing size need all the nutrients and moisture for satisfactory production.

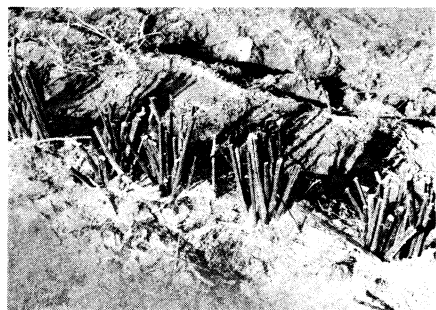
TRAINING

Train blackberry plants to trellises.

Erect blackberry plants can be grown without support, but many of the canes may be broken during cultivation and picking. Trellises will pay for themselves by reducing this damage.

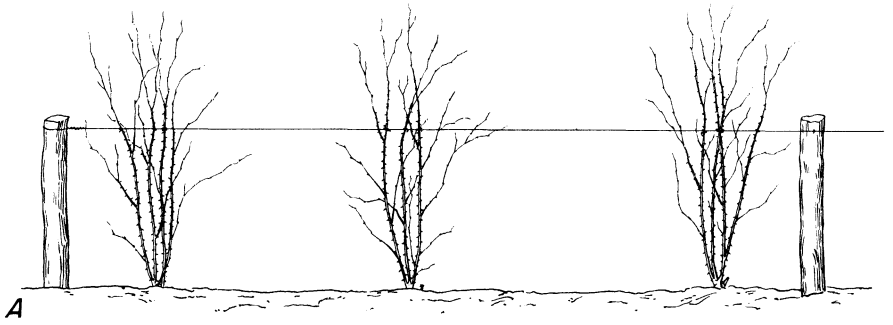
Many trellis arrangements and methods of training are in use by blackberry growers. The simplest methods of trellis construction and of training are as follows:

- Construct trellises by stretching wire between posts set 15 to 20 feet apart in the row. For erect blackberries, use a single wire attached to the post about 30 inches from the ground. For semitrailing and trailing blackberries, use two wires, one about 3 feet

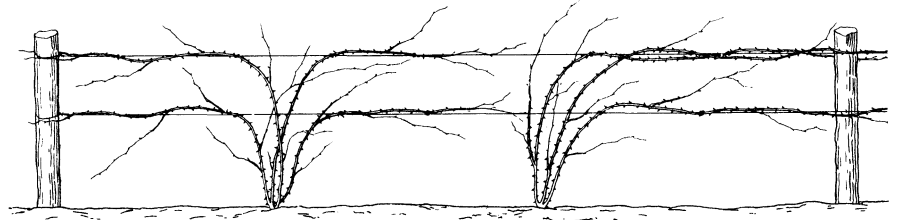


BN-10854-X

Blackberry plants from the nursery should be heeled in to keep the roots moist until the field is ready to plant.



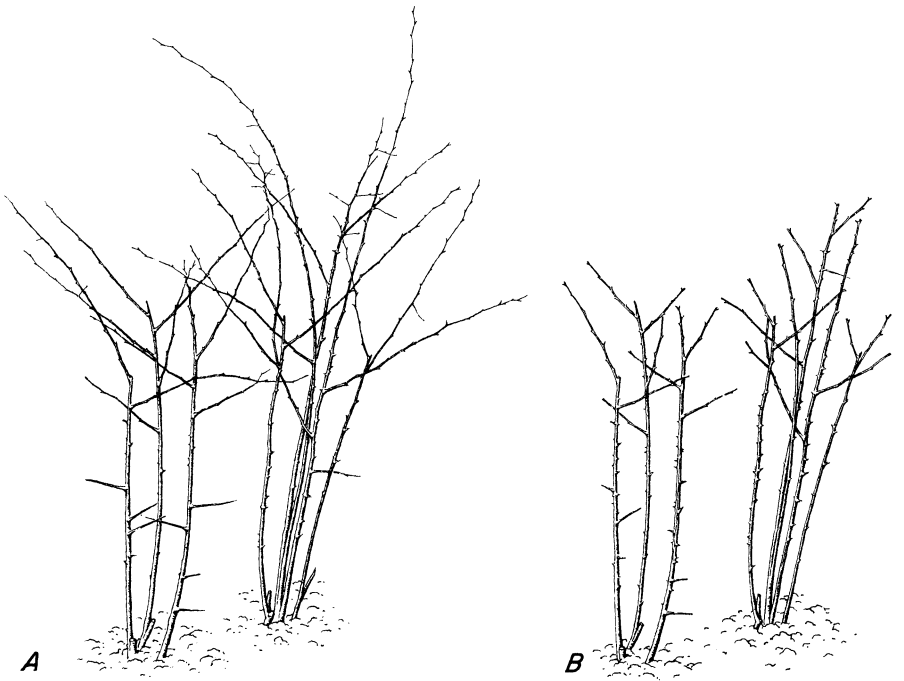
A



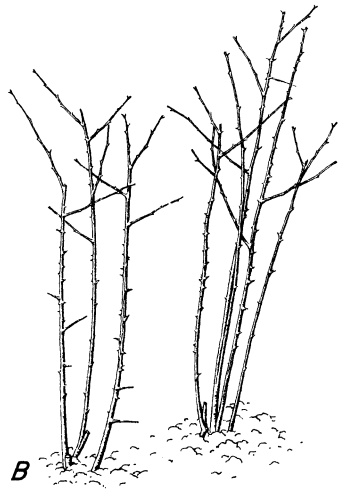
B

BN-10852-X

Trellises for blackberries: *A*, train erect plants to a one-wire trellis; *B*, train trailing plants to a two-wire trellis.



A



B

BN-10851-X

An erect blackberry plant: *A*, before pruning; *B*, after pruning.

from the ground and the other about 5 feet from the ground.

- Tie the canes to the wires with soft string. Tie erect varieties where the canes cross the wire. Tie trailing canes horizontally along the wires or fan them out from the ground and tie them where they cross each wire. Avoid tying the canes in bundles.

PRUNING AND THINNING

The crowns of blackberry plants are perennial; new canes arise from them every year. The canes are biennial; they live for only 2 years. During the first year they grow and send out laterals (side branches). The second year, small branches grow from buds on the laterals. Fruit is borne on these buds. After the laterals fruit, the canes die.

The laterals should be pruned back in spring. Fruit from pruned laterals is larger and of better market quality than fruit from unpruned laterals.

Before growth starts, cut the laterals back to a length of about 12 inches.

Erect blackberries send up root suckers in addition to the new canes that arise from the crown. If all the root suckers were allowed to grow, they would soon turn the blackberry plantation into a thicket.

During the growing season, remove all suckers that appear between the rows. Pull the suckers out of the ground. Suckers that are pulled do not regrow as quickly as suckers that are cut down.

When canes of erect blackberries reach a height of 30 to 36 inches, cut off the tips. This makes the canes branch. Tipped canes also grow stout and are better able to support a heavy fruit crop than untipped canes.

In summer, as soon as the last berries have been picked, cut out all the old canes and burn them. Also, thin out the new canes leaving three or four canes of erect varieties, four to eight canes of semitrailing varieties, and eight to 12 canes of trailing varieties.

In areas of the South where anthracnose and rosette are serious diseases on blackberries, cut out all the canes—both old and new—after fruiting. Then fertilize and cultivate to promote growth of replacement canes for the next year's fruit crop.

If you let suckers form within rows of erect blackberries, thin the suckers to about five or six canes per lineal foot of row.

FERTILIZING

To get maximum yields from your blackberry plantation, apply fertilizer every year at blossoming time. In Southeastern and South Central United States, make a second application after fruiting.

Use commercial 5-10-5 fertilizer for the first application. Apply it as a top-dressing at a rate of 500 to 1,000 pounds per acre or 5 to 10 pounds per 50-foot row. Use nitrate of soda or ammonium nitrate after fruiting. Apply nitrate of soda at the rate of 200 to 300 pounds per acre and ammonium nitrate at the rate of 80 to 100 pounds per acre.

CULTIVATING

Blackberry plantations should be cultivated thoroughly and frequently. If grass and weeds get a start, they are difficult to control.

Begin cultivating in the spring as

soon as the soil is workable. Cultivate throughout the season as often as necessary to keep weeds down. This may be as often as once a week. Discontinue cultivation at least a month before freezing weather normally begins.

To avoid harming shallow roots of the plants, cultivate only 2 or 3 inches deep near the rows. A tractor-mounted grape hoe or a rotary hoe is useful for cultivating in the rows and under trellises.

HERBICIDES ¹

Weeds in rows and under trellises can be controlled with herbicides.

Herbicides suggested are:

- Simazine [2-chloro-4,6-bis(ethylamino)-s-triazine].
- Diuron [3-(3,4-dichlorophenyl)-1,1-dimethylurea].
- Dichlobenil [2,6-dichlorobenzo-nitrile].
- Chlorpropham [isopropyl *m*-chlorocarbanilate].
- Dinoseb [2-*sec*-butyl-4,6-dinitrophenol].

Simazine and diuron are applied to the soil to control many germinating broadleaf weeds and grasses including pigweed, lambsquarters, crabgrass, and others. They will not control established weeds.

Use simazine after clean cultivation

¹By W. V. Welker, Jr., Northeastern Region, Agricultural Research Service.

of the soil in early spring or during dormancy after canes have been trained. Use diuron after clean cultivation during dormancy. Rotate use of these herbicides from year to year to avoid excessive buildup of herbicide residues in the soil and prolonged exposure of the crop to one herbicide.

Dichlobenil is most effective when applied during cool weather. Apply it in late fall or early spring. It should be used only on established plantings. If applied during new shoot emergence, it may cause temporary stunting of the new shoots. Dichlobenil, in addition to controlling annual weeds, will also control certain perennial weeds.

Use chlorpropham as a dormant treatment in late fall or early spring. It will control established as well as germinating common chickweed.

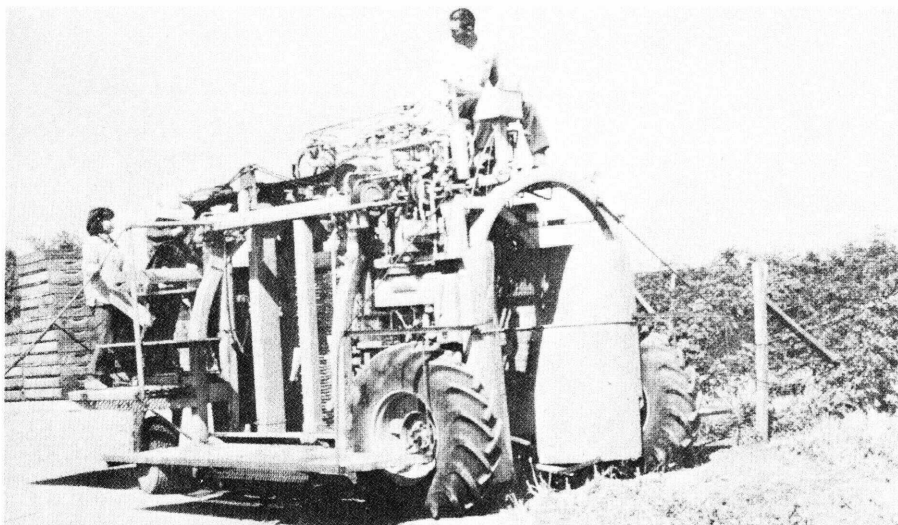
Use dinoseb during dormancy of the crop to kill young weeds that are less than 4 inches tall. Weed foliage must be thoroughly wetted by the spray.

GROWING COVER CROPS

Winter cover crops help prevent soil erosion and they add humus to the soil. They also help protect blackberry canes during the winter by shielding the canes from drying winds.

Sow a cover crop at the last cultivation. Drill cowpeas, spring oats, or rye in the middles leaving 12 to 15 inches next to the plants free of cover crop.

Turn under the cover crop the following spring.



Harvesting machine that straddles a row of blackberries.

HARVESTING

Firm, ripe blackberries bring the highest market price. Berries that are picked at the proper time, handled carefully, and stored in a cool place will stay in good condition for several days. Berries that are overripe or injured spoil quickly.

Pick the fruit as soon as it becomes sweet. It should be fully ripened but firm.

Pick often; for most varieties, pick berries every other day. The fruit of the Evergreen and Thornfree varieties remains firm longer than fruit of other varieties and may be picked less frequently—once a week is often enough.

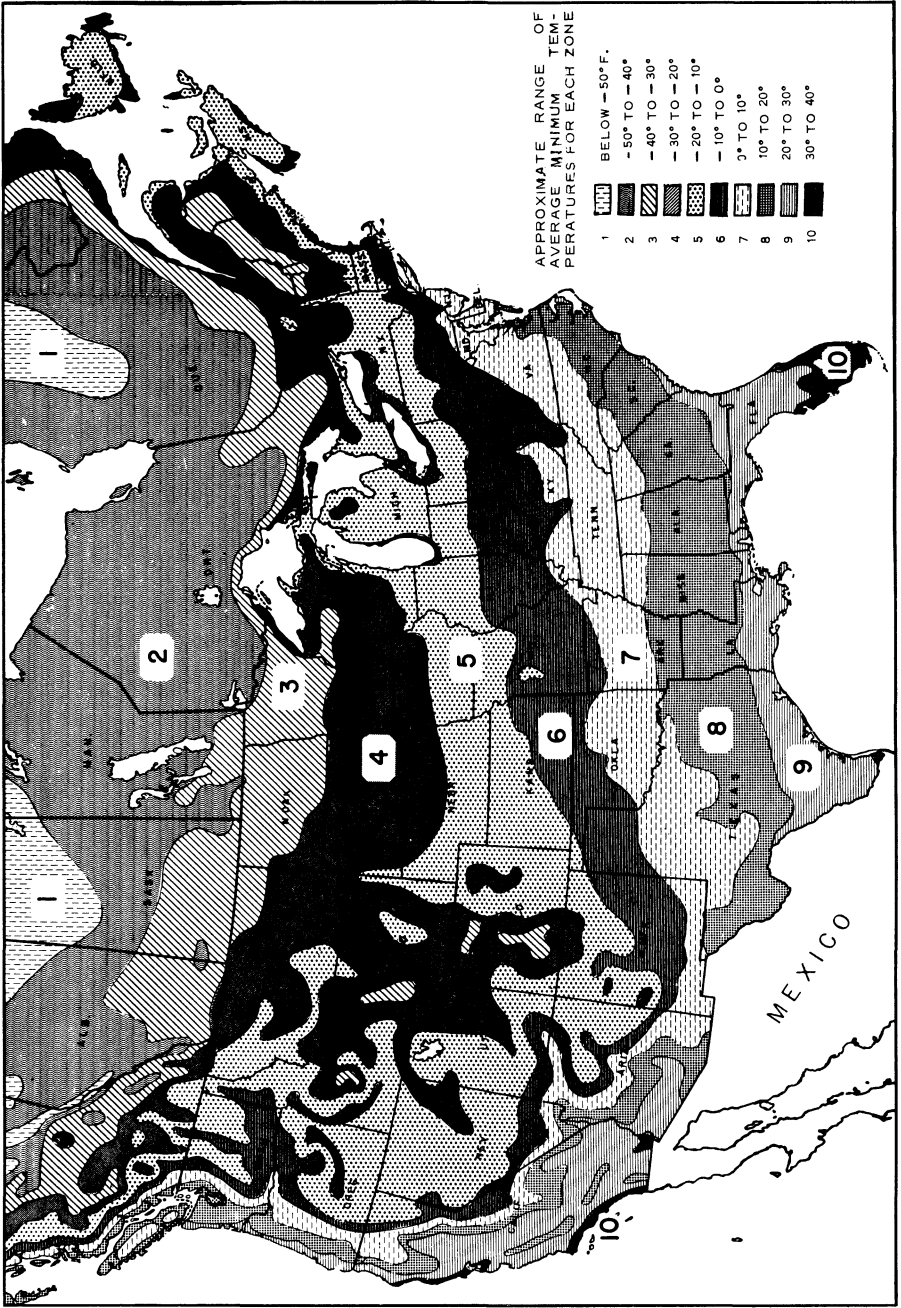
Pick early in the day. Try to finish picking before the hottest part of the day. Blackberries do not spoil as quickly if they are picked in the morning as they do if they are picked in the afternoon.

Pick carefully for fresh market. Do not crush or bruise the fruit. Place the

fruit carefully in the berry baskets. As soon as the baskets are full, place them in the basket carrier, which should always be kept in the shade.

Approximately 40 percent of the blackberries in the Northwest are harvested by machines. These machines are large, in some cases self-propelled, over-the-row types that are economical to operate on units of 20 acres or more planted with long rows. Some machines are owned by growers, and others are leased by growers from a processing company or the manufacturer.

The main varieties harvested in order of ease and fruit quality are—Thornless Evergreen, Chehalem, and Marion. Boysenberries and Logans do not harvest well with present mechanical techniques, but future adaptations of the harvesting machine may change this. Special training of new canes is usually necessary to enable the berry-catching mechanism of the harvesting machine to be most efficient.



HARDINESS OF BLACKBERRY VARIETIES BY TEMPERATURE ZONES

<i>Variety</i>	<i>Zone</i>	<i>Variety</i>	<i>Zone</i>
Alfred	4, ^a 5, 6	Georgia Thornless	9
Austin Thornless	7, ^a 8	Hedrick	5, ^a 6, 7 ^c
Bailey	5, 6	Hillquist	6, ^a 7, 8 ^c
Boysen	7, 8	Jerseyblack	6, 7
Brainerd	6, ^a 7, 8	Lawton	6, ^a 7, 8 ^c
Brazos	8, 9	Logan	7, ^a 8 ^c
Cascade ^b	7, ^a 8 ^c	Lucretia	7, 8 ^c
Chehalem ^b	7, ^a 8 ^c	Mammoth ^b	7, ^a 8 ^c
Cory Thornless ^b	7, ^a 8	Marion ^b	8 ^c
Dallas	6, ^a 7, 8 ^c	Mayes	7, ^a 8
Darrow	5, 6, 7	Midnite	6, ^a 7, 8 ^c
Dewblack	6, ^a 7, 8 ^c	Nanticoke	6, 7, 8
Early Harvest	6, ^a 7, 8 ^c	Oklawaha	9
Early Wonder	6, ^a 7, 8	Olallic ^b	8 ^c
Ebony King	5, ^a 6, 7	Ranger	6, ^a 7
Eldorado	5, 6, 7	Raven	6, ^a 7
Eric	5, 6, 7 ^c	Smoothstem	7, 8 ^c
Evergreen ^b	8 ^c	Snyder	5, 6
Flint	7, 8	Thornfree	6, ^a 7, 8 ^c
Flordagrind	9	Williams	8
Gem	8	Young	6, ^a 7, 8

^a Subject to winter injury in some years if not protected.

^b Not adapted to States east of Arizona.

^c Adapted to northern part of zone or higher elevations.

Special efforts must be made to have fields relatively free of diseases (particularly fruit rot) and insects for mechanical harvest. All the mechanically harvested fruit goes into the processing market.

PROPAGATING

Blackberry plants are easy to propagate. Most growers propagate their own planting stock.

Erect blackberry plants can be propagated from root suckers or root cuttings. The latter method yields the greatest number of new plants. Trailing blackberries and some semitrailing varieties are propagated by burying the tips of the canes, which will root and form new plants.

The easiest way to propagate erect blackberry plants is by planting root cuttings in a location where they will fruit. Dig pieces of root from around established plants in early spring. The root pieces should be at least $\frac{1}{4}$ inch in diameter. Cut the roots into 3-inch lengths and bury them in trenches 2 or 3 inches deep.

Propagate tip plants from trailing blackberries in late summer. Loosen the soil around each plant, and bury the tips of the canes about 3 inches deep, pointing the tips straight down.

Thornless Evergreen and Thornless Logan must be propagated by tipping as the other methods give rise to thorny plants.

PREVENTING WINTER INJURY

Hardy varieties of blackberries can withstand still-air temperatures as low as -20°F . Throughout most of the areas where they are grown, adapted

varieties need no special protection in the winter.

However, in areas where winter temperatures are colder than -20°F . or cold, drying winds are likely to occur, the plants should be protected during the winter. In the fall, after warm weather has ended but before the ground is frozen, bend the canes over to the ground and cover them with a layer of soil, straw, or coarse manure. Uncover the plants in spring after severe weather has ended.

In western Oregon, where winters are mild and moist, canes of trailing varieties occasionally show a form of winter injury when they are allowed to lie on the ground. There, they are best tied to trellises in late summer and allowed to stay up through the winter. However, if the winter has severe drying winds, considerable injury may occur when canes are on the trellis.

DISEASES ²

General Disease Control Practices

Damage from disease can be kept at a minimum if these general suggestions are followed:

- Plant row crops for several years before replanting a field to blackberries.
- Choose disease-resistant varieties.
- Select high quality planting stock free of nematodes and diseases. Examine the planting stock yourself for freedom from diseases whenever you can.
- Remove old canes from the field or thoroughly disk them under.
- Keep the field free of weeds and fallen leaves.

² By R. H. Converse, Western Region, Agricultural Research Service.

- Destroy plants in which disease appears.

- Remove all wild blackberry and raspberry plants in the vicinity of the field and destroy all plants in abandoned fields.

Root Disease

Verticillium wilt is a soil-borne fungus disease that infects canes of susceptible varieties. Examples of susceptible varieties are Boysenberry, Youngberry, and Lucretia. Susceptible canes turn yellow and die in mid-summer. The disease is common wherever blackberries are grown in the United States except in the Southeast. Susceptible blackberries should not be planted in fields that have recently grown solanaceous crops such as potatoes, tomatoes, peppers, and eggplant. Soil fumigation with chloropicrin, a costly procedure, can control verticillium wilt.

Some resistant blackberry varieties are Evergreen, Olallie, and Lawton.

Bacterial Diseases

Crown gall and *cane gall* are caused by bacteria that live in the soil. They infect blackberries through wounds caused by pruning and cultivation. The diseases are widespread throughout the United States. Wartlike growths develop on infected crowns and canes, often weakening plants. Crown gall and cane gall are prevented by planting gall-free nursery stock in clean soil.

Foliage Diseases

Anthracnose is caused by a fungus that produces numerous small purple spots on canes, leaves, and fruit stems. Anthracnose is most severe in Southeastern United States. The disease is controlled by sanitation and by spraying with liquid lime sulfur or poly-

sulfide plus a spreader sticker in late winter while plants are still dormant. Lime sulfur or polysulfide plus a spreader sticker can be applied at the start of bloom. This will also help to control leaf and cane spot.

Leaf and cane spot is a fungus disease common in the Southeastern States and in the Pacific Northwest. Purple spots with white centers develop on leaves and canes, sometimes causing early defoliation and weakening of the canes. Control procedures include cutting out and removing infected canes from the field after harvest. The spray program used for anthracnose control (see above) is also recommended. In the Pacific Northwest, spray Bordeaux mixture (8-8-100) or fixed copper plus a spreader sticker in late September or early October to help control outbreaks of the disease. Two additional fixed copper sprays should be applied in March for severe outbreaks.

Orange rust is a fungus disease that is common in the eastern half of the United States. The fungus is established internally in the crown of the plant. In the spring, new leaves of infected plants develop orange blisterlike pustules of spores. Such plants are weak and barren. Sprays do not control this disease. Control is accomplished by planting nursery stock that is free from orange rust in fields that are free of infected blackberries. Disregard rust pustules that develop late in the season on old leaves—these are caused by relatively harmless leaf rust fungi.

Fruit and Flower Diseases

Double blossom is a fungus disease which may chronically infect blackberry plants in the Southeastern States.

GUIDE FOR USE AND SELECTION OF INSECTICIDE ¹

Insect	Insecti- cide	Minimum days from last application to harvest	Formulation ²	Where and when to apply
Aphids	diazinon	<i>Number</i> 7	D, EC, or WP	On foliage as needed.
	malathion	1	D, EC, or WP	
	parathion	15	D, EC, or WP	
Japanese beetle.	carbaryl	7	D or WP	On foliage as needed.
	malathion	1	D, EC, or WP	
	methoxy- chlor.	3	EC or WP	
Orange tortrix.	carbaryl	7	WP	On foliage in Northwest when first blossoms appear.
Raspberry crown borer.	diazinon	7	EC	On lower canes & crown; first week in October.
	parathion	15	EC or WP	
Raspberry fruitworms and raspberry sawfly.	rotenone	1	D, extract or powder.	On foliage when blossom buds appear & just before blossoms open.
Redberry mite.	lime	L	On dormant plants only.
	sulfur.	L	

See footnotes at end of table, p. 13.

GUIDE FOR USE AND SELECTION OF INSECTICIDE ¹—Continued

Insect	Insecticide	Minimum days from last application to harvest	Formulation ²	Where and when to apply
Red-necked cane borer.	rotenone	<i>Number</i> 1	D, extract or powder.	On foliage just before plants bloom; repeat in about 2 weeks.
Rose chafer	carbaryl	7	D or WP	On foliage as needed.
	methoxychlor.	3	D or WP	
Rose leaf hopper.	malathion	1	D, EC, or WP	On foliage as needed.
Rose scale	malathion	1	D, EC, or WP	On foliage as needed.
	summer oil.	EC	On dormant plants only.
Spider mites.	demeton	(3)	EC	On foliage as needed. Apply demeton after harvest, in late summer or fall.
	dicofol	2	EC or WP	
Stink bugs	carbaryl	7	D or WP	On foliage as needed.
Strawberry weevil.	methoxychlor.	3	D or WP	On foliage when insects first appear.
White grubs	chlordane	(4)	EC or WP	Broadcast on soil and thoroughly work into upper 4-6 inches.

¹ See Precautions, p. 18.

² D = dust, EC = emulsifiable concentrate, WP = wettable powder, L = liquid.

³ Apply demeton only after last harvest.

⁴ Do not apply chlordane when fruit is present. Do not repeat applications of chlordane for at least 3 years.

It causes flowerbuds to enlarge and produce coarse reddish flowers with twisted petals which make the flowers appear double. These flowers do not produce fruit. Infected plants also develop abnormal broomlike growths of leafy shoots. To control the disease, cut *all* canes close to the ground after harvest and remove them.

Fruit rots caused by several fungi can infect blackberry fruit before or after harvest. Infected fruit is usually overgrown with a gray or black cottony fungus mass. Fruit rot fungi are universally present but develop most readily on damaged and overripe berries. To control the disease, carefully pick sound fruit at frequent intervals and quickly store the fruit under refrigeration at 32° to 40°. Apply fungicide sprays at the beginning of bloom and at 10-day intervals until harvest if fruit rot is severe, as in rainy weather. Use captan, dichloran, or benomyl. Captan can be applied until harvest (25 ppm tolerance), but dichloran may not be applied within 1 day of harvest and may not be applied more than four times in one season (15 ppm tolerance). Benomyl may not be applied within 3 days of harvest (7 ppm tolerance).

Sterility is a virus disease that causes blackberry plants to produce completely or partially sterile flowers. It is common in the Eastern States. Infected plants grow vigorously without apparent symptoms until fruiting time. To control sterility, plant stocks that are free from this virus and eliminate unfruitful plants whenever they are found.

INSECTS

The blackberry is comparatively free from insect injury; however, the fruit

or foliage may become infested with aphids, leafhoppers, mites, sawflies, scales, fruitworms, stinkbugs, leaf rollers, beetles, and weevils. The canes are occasionally attacked by borers, and the roots by white grubs.

Damage from insects can be kept at a minimum if these general suggestions are followed:

- Prune out insect-infested canes and burn them.
- Remove old canes after harvest.

If you need to use pesticides to control insects, purchase only the amount necessary for the current insect problem.

Insects and the insecticides recommended for their control are shown in the table on pages 12 and 13. Follow the directions and heed all precautions on the pesticide label.

CONTROL

The pesticides mentioned in this publication are available in several different formulations that contain varying amounts of the active ingredient. Because of differences in active ingredients, dosage rates are not indicated in this publication.

The user is cautioned to read and follow all directions and precautions given on the label of the pesticide formulation that will be used.

POLLINATION

Some self-unfruitful varieties of blackberries require cross-pollination. Other varieties, even though self-fruitful, may benefit from the pollen-distributing visits of insects. The flowers of blackberries are very attractive to honey bees, the primary pollinators,

and small acreages are usually pollinated adequately by them.

If a variety of blackberry is known to require cross-pollination, insure a sufficient supply of pollinators in large acreages by placing colonies of honey bees in or near the field.

Use pesticides on the plants that are least toxic to bees; time the pesticide applications to avoid hazard to bees.

VARIETIES

Following are descriptions of the major blackberry varieties grown in the United States. These descriptions include:

1. State where the variety originated.
2. Time of ripening.³
3. Characteristics.
4. Area of special adaptation.
5. Disease susceptibility.

For local variety recommendations, consult your county agricultural agent or your State agricultural experiment station.

Erect Varieties

ALFRED

1. Michigan.
2. Early.
3. Berries, large, firm, sweet. Bushes hardy, very vigorous, productive.
4. Adapted to northern States, especially Michigan.
5. Susceptible to orange rust.

BAILEY

1. New York.
2. Midseason.

³ The date of ripening cannot be given; it depends on many factors in addition to variety. The ripening time—very early, early, midseason, late, or very late—shows when a variety ripens in relation to other varieties grown on the same site. The time lapse between ripening of very early varieties and very late varieties may be as little as 20 days or as much as 40 days.

3. Fruit large, glossy black, medium firm. Bushes tall, vigorous, productive, hardy.
4. Grown in New York.
5. Susceptible to orange rust.

BRAZOS

1. Texas.
2. Early.
3. Fruit large, attractive, fairly firm. Bushes very vigorous, productive.
4. Texas and gulf coast area.

DALLAS

1. Texas.
2. Early.
3. Berries large, firm. Bushes semitrailing, vigorous, productive. Hardy to -10° F. with wind protection.
4. Grown in Texas and Oklahoma.

DARROW

1. New York.
2. Early; long fruiting season.
3. Berries glossy black, large, firm, mildly subacid. Bushes vigorous, hardy, very productive.

EARLY HARVEST

1. Illinois.
2. Early; long fruiting season.
3. Berries medium size, firm. Bushes moderately vigorous, erect, very productive in the South. Desirable variety for the South.
4. Grown as far north as Maryland and southern Illinois.

EARLY WONDER

1. Texas.
2. Early.
3. Berries medium size, firm. Bushes vigorous, productive. Semitrailing.
4. A leading variety in Texas and Oklahoma.

ELDORADO

(Stuart, Lowden, Texas)

1. Ohio.
2. Early to midseason; long fruiting season.
3. Berries medium to large, firm, sweet. Bushes hardy, productive, very vigorous. One of the best varieties in adapted area.
4. Not adapted in the extreme South.
5. Most resistant to orange rust of widely grown varieties.

EVERGREEN

(See *Thornless Evergreen.*)

FLINT

1. Georgia.
2. Midseason.
3. Berries large, firm, good flavor. Plants productive, very vigorous, semi-upright, prolonged ripening.
4. Adapted in South and Southwest.
5. Resistant to leaf spot and anthracnose.

GEORGIA THORNLESS

1. Georgia.
2. Midseason.
3. Berries large, oblong, firm, good flavor. Plants thornless, semi-upright, productive.
4. Adapted in gulf coast region.

HAUPT

1. Texas.
2. Late.
3. Berries large, fairly firm. Bushes very productive. Hardy to 0° F. if protected from wind. Canes semitrailing, roots at tips.
4. Grown in eastern Texas.

HEDRICK

1. New York.
2. Early.
3. Berries large, glossy, firm. Bushes vigorous, productive, hardy.
4. Grown in New York.
5. Susceptible to orange rust.

JERSEYBLACK

1. New Jersey.
2. Midseason; long fruiting season.
3. Berries medium to large, firm, mildly subacid. Bushes semitrailing, vigorous, productive.

LAWTON

(*New Rochelle*)

1. New York.
2. Midseason.
3. Berries large, soft, sweet. Bushes vigorous, productive.
4. Grown mostly in Texas and Oklahoma.
5. Resistant to orange rust.

NANTICOKE

(*Hirschi, Healthberry*)

1. Maryland.

2. Very late; long fruiting season.
3. Berries medium size, soft, sweet. Bushes hardy, vigorous, drought resistant, productive, very thorny.
4. Adapted along Atlantic coast.

RANGER

1. Maryland.
2. Early, short ripening season.
3. Berries medium size, firm, good subacid flavor. Bushes moderately vigorous, productive in central Atlantic region. Stiff canes.
4. Grown from southern Pennsylvania and southern New Jersey southward.

RAVEN

1. Maryland.
2. Early, short ripening season.
3. Berries medium large, medium firm, very good subacid flavor. Bushes moderately vigorous, productive in South.
4. Grown from southern Pennsylvania and southern New Jersey southward and west to south central United States.

SMOOTHSTEM

1. Maryland.
2. Very late.
3. Berries large, firm, tart, good flavor. Bushes very vigorous, productive. Canes thornless, semi-upright.
4. Adapted from southern Maryland to North Carolina along Atlantic coast. Good for home gardens.
5. Resistant to leaf spot.

THORNFREE

1. Maryland.
2. Late.
3. Berries large, firm, tart, very good flavor. Bushes medium vigorous, productive. Canes thornless. Semi-upright.
4. Hardy from central New Jersey, southern Pennsylvania, southern Ohio southward to North Carolina and west to Arkansas, and in Pacific Northwest. Not winter hardy in the North. Good for home gardens.
5. Resistant to leaf spot.

THORNLESS EVERGREEN

1. Oregon.
2. Very late.

3. Mutation of Evergreen. Berries large, exceptionally firm, sweet. Seeds large. Bushes vigorous, productive, deep rooted, drought resistant. Hardy to -10° F. with protection. Canes semitrailing, roots at tips.
4. A major variety in Oregon and in Washington. Not generally adapted to States east of the Rocky Mountains. Propagates from tip plants only.
5. Susceptible to rosette in Atlantic Coast States.

Trailing Varieties

BOYSEN

(*Boysenberry, Nectar, Rossberry*)

1. Origin unknown.
2. Late.
3. Berries very large, tart, high flavor, soft.
4. Widely grown in South and on Pacific coast.

CASCADE

1. Oregon.
2. Early.
3. Berries bright, deep red, have excellent flavor, highest dessert quality. Plants vigorous, very productive. Hardy only in Pacific coast region.
4. Grown in western Oregon and Washington.

CHEHALEM

1. Oregon.
2. Late.
3. Berries small, shiny black, have excellent flavor. Seeds small. Plants vigorous, very productive.
4. Adapted to Pacific coast.

FLORDAGRAND

1. Florida.
2. Very early.
3. Berries large, glossy, soft, aromatic. Bushes vigorous, productive, disease resistant. Require cross-pollination.
4. Best adapted in Florida and along the gulf coast.
5. Resistant to leaf spot and double blossom.

GEM

1. Georgia.
2. Early.
3. Berries large, round, firm, good flavor.
4. Adapted in gulf coast region.
5. Resistant to anthracnose and leaf spot.

LOGAN

(*Loganberry*)

1. California.
2. Early.
3. Berries large, long, dark red, acid, high flavored. Plants vigorous, very productive. Thornless form most widely grown.
4. Grown on Pacific coast. Not adapted to East.

LUCRETIA

(*Bingleberry*)

1. West Virginia.
2. Early.
3. Berries large, long, firm. Plants vigorous, productive.
4. Hardy if protected against severe winter weather.
5. Susceptible to anthracnose and leaf spot.

MARION

1. Oregon.
2. Late.
3. Berries medium to large, bright black, of medium firmness. Plants very vigorous and productive. Canes heavy.
4. Adapted to western Oregon and western Washington.

MAYES

(*Austin Mayes*)

1. Texas.
2. Early.
3. Berries large, soft. Plants vigorous, productive.
4. Leading variety in Texas.
5. Susceptible to anthracnose and rosette.

OKLAWAHA

1. Florida.
2. Very early.
3. Berries medium size, good flavor, aromatic fruit, somewhat soft. Serves as pollinator for Flordagrاند.
4. Florida and gulf coast region.

OLALLIE

1. Oregon.
2. Midseason.
3. Berries large, firm, bright black. Plants very productive, vigorous.
4. Adapted to California, western Oregon, and gulf coast region.

SANTIAM

1. Oregon.
2. Early.
3. Bright, deep red color, excellent flavor, medium vigor.
4. Hardy only in the Northwestern United

States, especially Oregon (Willamette Valley).

5. Susceptible to leaf spot.

YOUNG

(*Youngberry, Lavaca*)

1. Louisiana.
2. Midseason.
3. Berries very large, wine colored, very sweet. Plants vigorous.
4. Adapted in South and Pacific States.
5. Somewhat resistant to anthracnose and common leaf spot. Susceptible to rosette.

PRECAUTIONS

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid

treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Demeton and parathion are highly toxic and may cause death if swallowed, inhaled, or absorbed through the skin. They should be applied only by persons who are thoroughly familiar with their hazards and who will assume full responsibility for their safe use.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level, isolated place.